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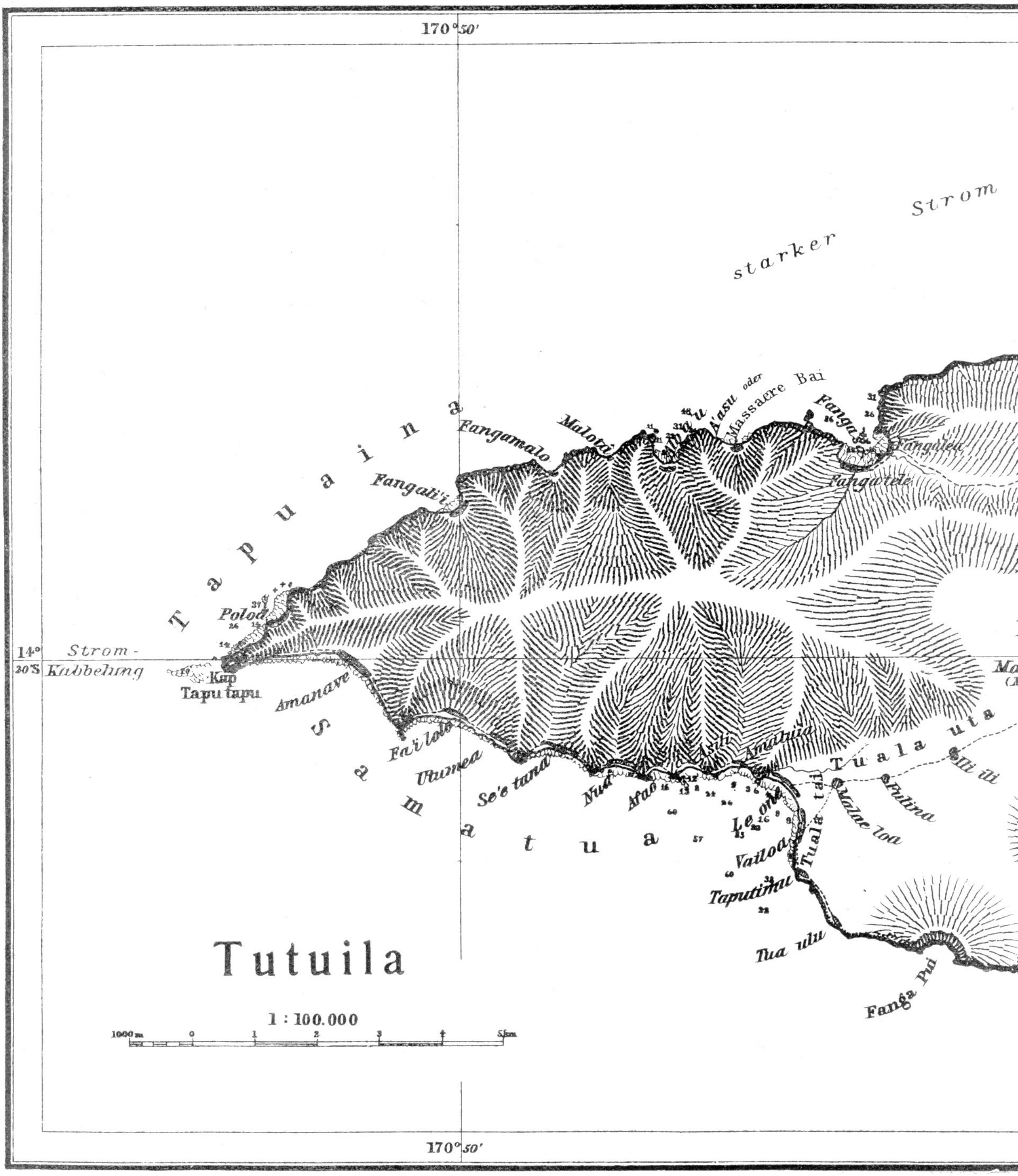
A NEW MAP OF THE AMERICAN SAMOAN ISLANDS

In the April, 1912, number of *Petermanns Mitteilungen* a new map was published of Tutuila and of the Manua group of the Samoan Islands which embodies the results of original surveys made in December, 1910, by Dr. Kurt Wegener of the German seismological observatory at Apia. In view of the fact that these islands belong to the United States and that Dr. Wegener's delineation of them differs considerably from that on the relevant charts published by the Hydrographic Office, the map from *Petermanns Mitteilungen* (in two sections: one showing Tutuila and the other the Manua group) is reproduced herewith. The publication of this map seems all the more timely as, according to recent correspondence with the bureaus concerned, the U. S. Coast and Geodetic Survey, under whose jurisdiction would fall the survey of the coasts of these islands since their cession to the United States in 1900, is not contemplating a survey of the islands at present owing to other claims on its time, and the U. S. Hydrographic Office, under whose auspices the only extant official American maps of the islands or of parts of them are published, is likewise contemplating no extensive resurvey in the



MAP OF TUTUILA, SA

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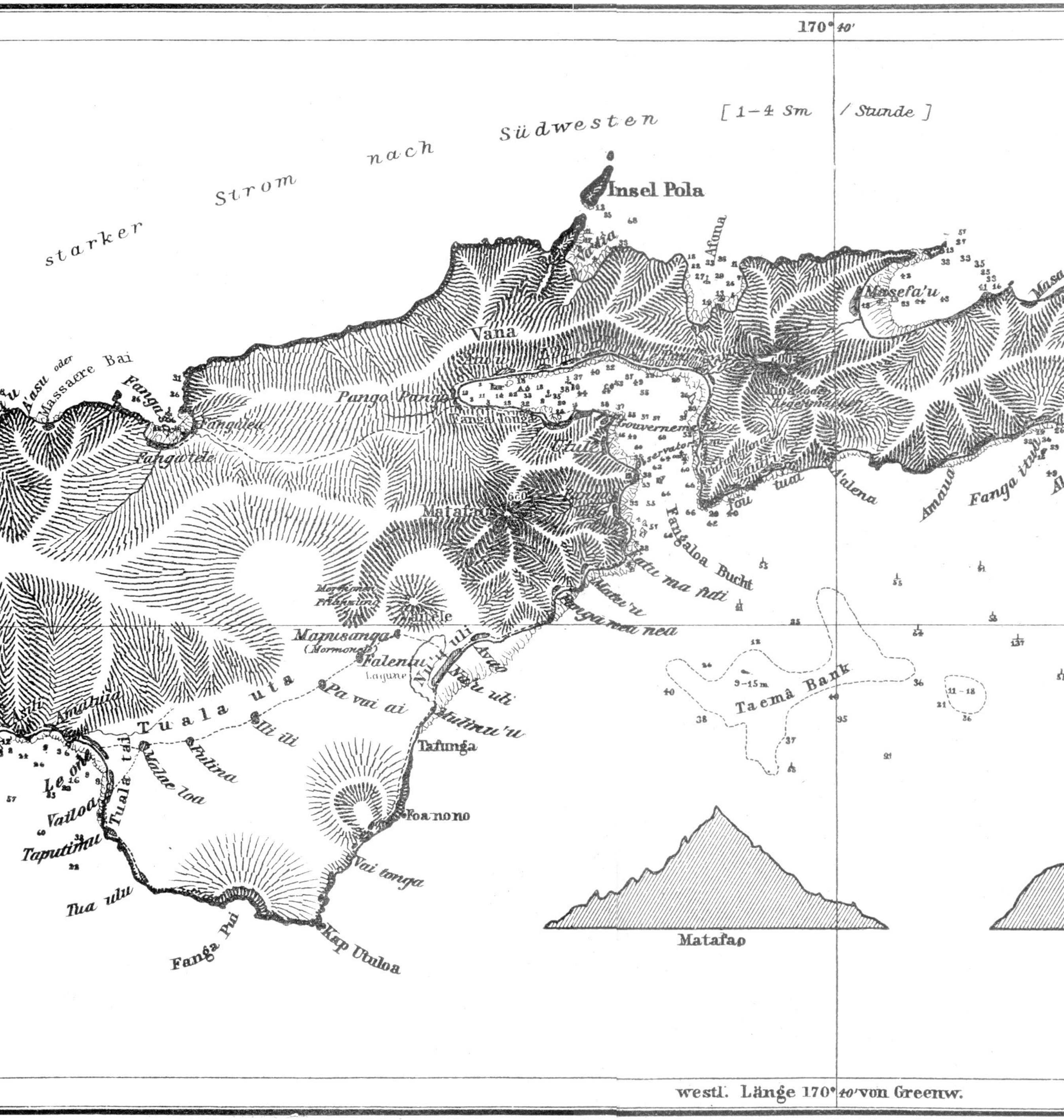
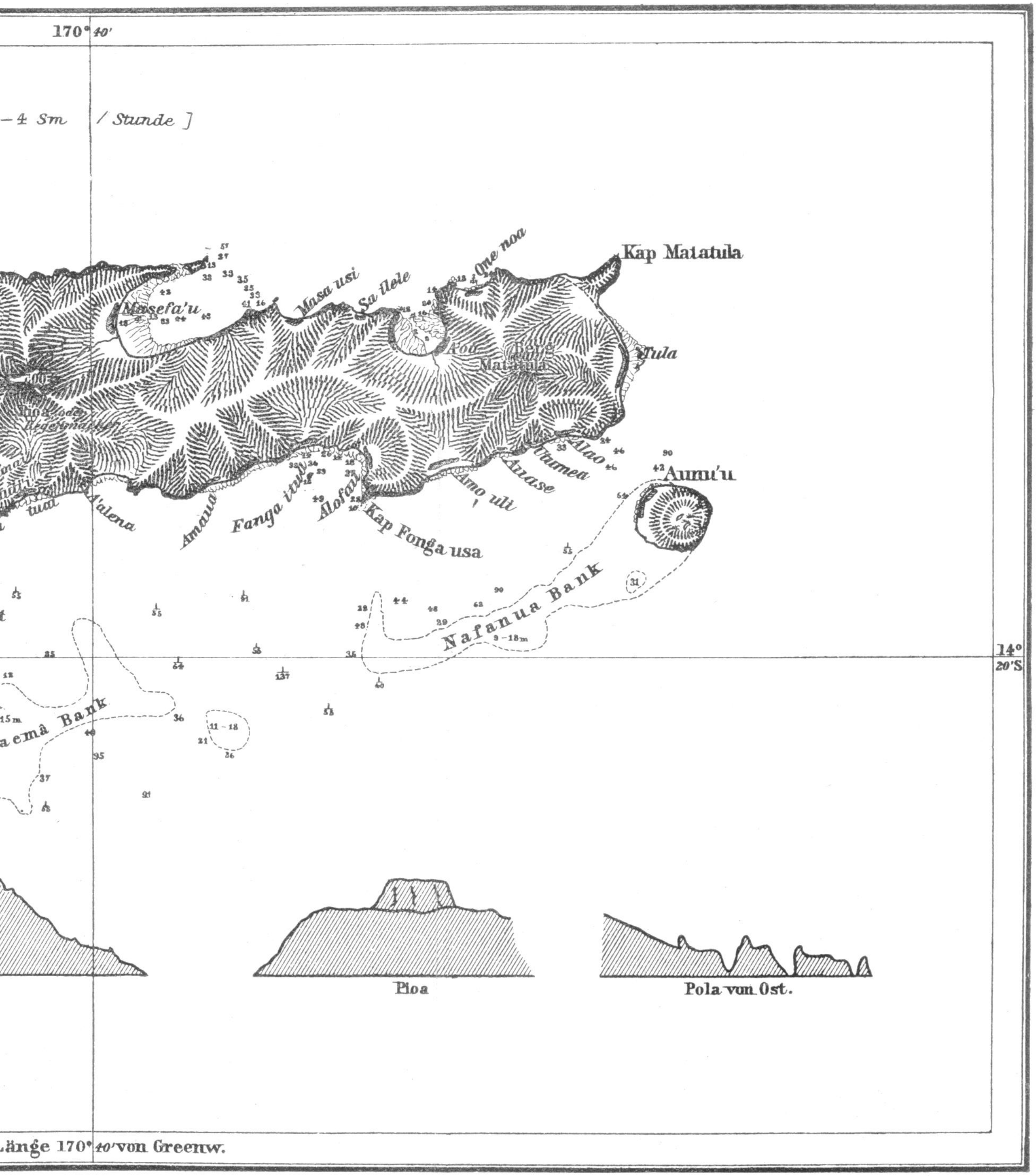


MAP OF TUTUILA, SAMOAN ISLANDS, FROM SURVEYS BY DR. KURT WEGENER

REPRODUCED FROM PL. 40, VOL. 58, I, 1912, OF PETERMANNS MITTEILUNGEN



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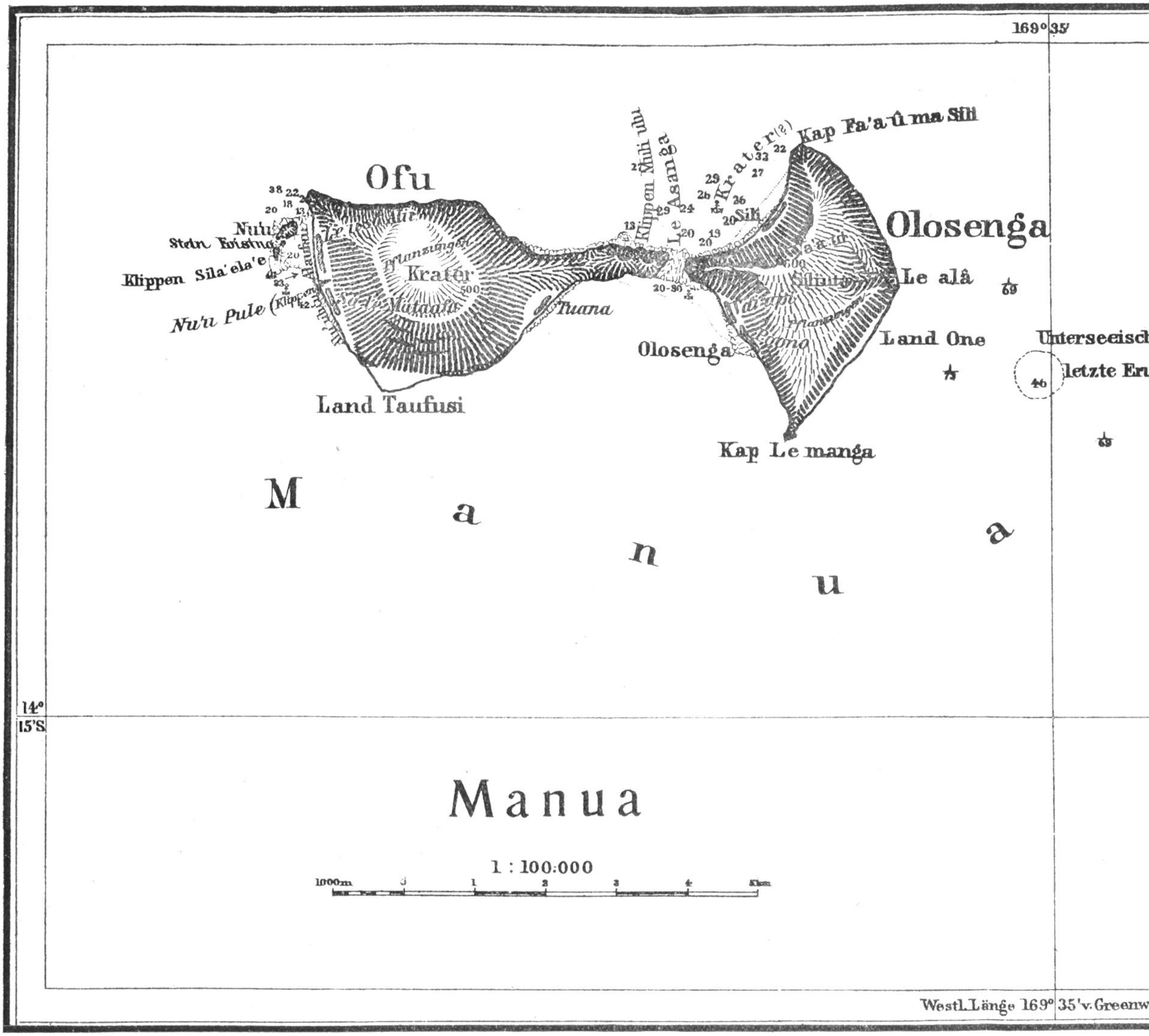

MAP OF THE MANUA GROUP OF THE SAMOAN ISLANDS FRO

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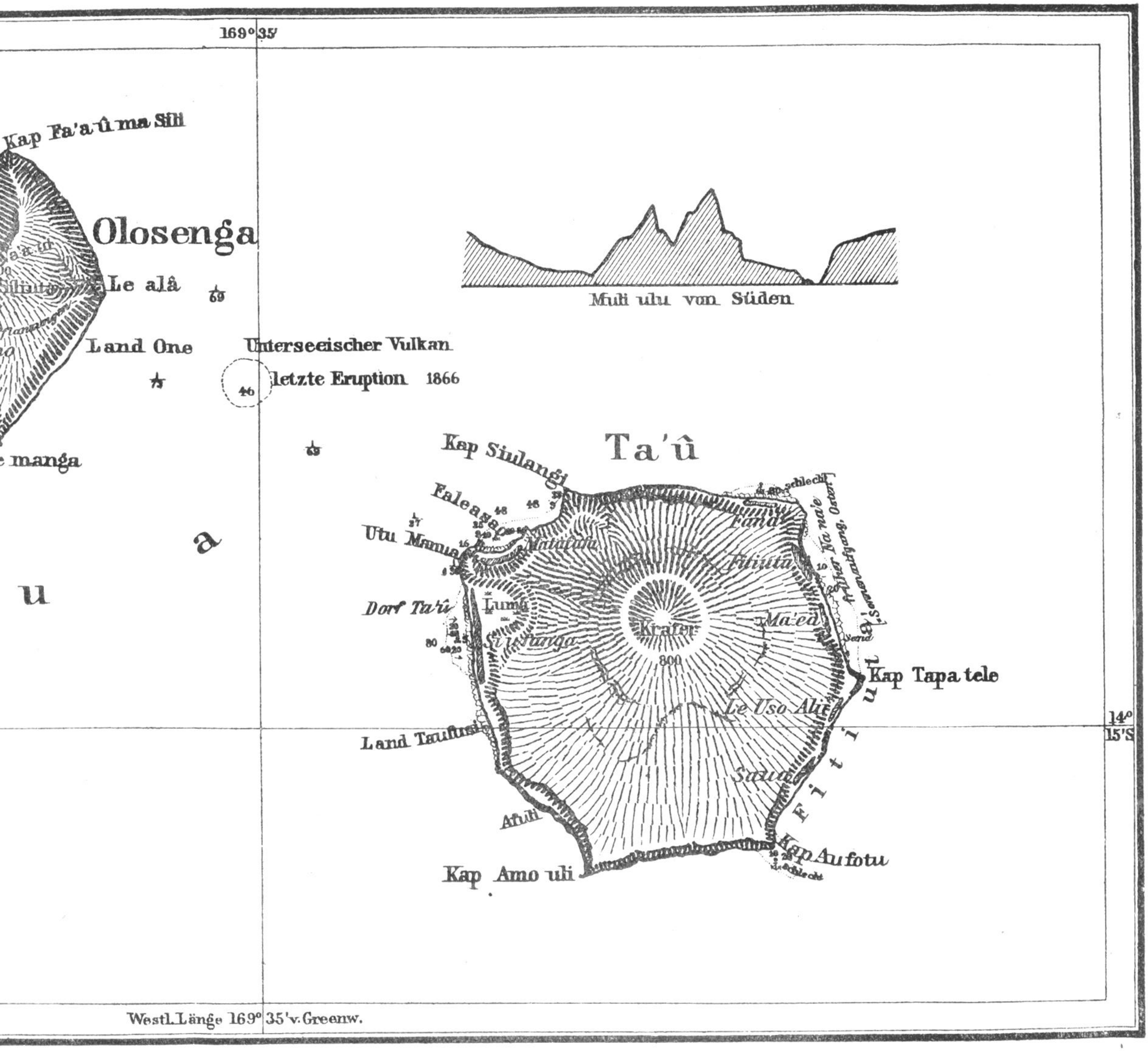

E SAMOAN ISLANDS FROM SURVEYS BY DR. KURT WEGENER

PL. 40, VOL. 58, I, 1912, OF PETERMANNS MITTEILUNGEN near future, although minor surveying operations may be undertaken from time to time.

The official maps referred to are the general map of Tutuila and of the Manua group on the mean meridional scale of 1:145,000 (U. S. Hydrographic Office Chart No. 90), which goes back to the surveys made in 1839 by the U. S. Exploring Expedition under Commander Wilkes, and Charts Nos. 92, 93, 2563 and 2637 of the same office. Charts Nos. 92 and 93 consist of inset maps of bays and of other details of navigational interest and are based in part on the work of the Wilkes Expedition and in part on later American and British surveys. These later surveys have, as a rule, not been incorporated on the general map of the island; reference is made, however, at the corresponding places to the proper inset maps. Chart No. 2563, on the scale of 1:8,400, is a detailed map of Pago Pago Harbor based on recent surveys by officers of the U. S. Navy between 1901 and 1910. Chart No. 2637, which supersedes former Chart No. 229, is a map of Leone Bay, on the southwestern coast of Tutuila, on the scale of 1:9,200, based on a survey by the U. S. S. *Annapolis* in 1909.

A comparison of Dr. Wegener's map with the general map of the islands published by the Hydrographic Office at first glance reveals a noticeable discrepancy in the representation of the size of the individual islands. While the former map is on the scale of 1:100,000 and the latter on that of 1:145,000, Tau (or Manua) Island, for instance, is of about the same absolute size, irrespective of scale, on both maps. The difference in size, too, between Tau on the one hand and Ofu and Olosenga on the other, is much greater on the Hydrographic Office chart than on Dr. Wegener's map. In the note accompanying his map (*Pet. Mitt.*, Vol. 58, I, pp. 208-209) Dr. Wegener refers to the evident incorrectness of this ratio on present charts. The following table, based on approximate measurement by the method of squares (which should, of course, before final acceptance be verified by planimetric measurement), will elucidate these differences:

COMPARATIVE TABLE OF THE AREAS OF THE AMERICAN SAMOAN ISLANDS

	U. S. HYDROGR. OFFICE Sq. miles	WEGENER Sq. miles
Tutuila	49.2	50.5
Aunuu	0.4	0 4
Ofu	1.8	2.8
Olosenga	0.6	2.2
Tau (Manua)	19.1	8.6
	71.1	64.5

While the area of Tutuila and of the small island of Aunuu will thus be seen to be practically the same on both maps, the two sources are not in accord with regard to the area of the remaining Samoan Islands belonging to the United States (the detached atoll Rose Island in 14°32′ S. and 168°11′ W. is here not considered). Ofu is about one and one-half times and Olosenga even three and one-half times as large on Dr. Wegener's map as on the Hydrographic Office chart, while Tau Island, on the contrary, is less than one half as large on the former as on the latter map. The area of our Samoan possessions (exclusive of Rose Island, whose area, not counting its barrier reef, is about 0.8 square miles)—a subject not without interest—would thus be reduced by Dr. Wegener's map from 71.1 square miles to 64.5 square miles. The corresponding areas as given in the *Statesman's Year-Book* for 1912 (p. 572) are about 54 square miles for Tutuila and about 25 square miles for Tau, Ofu and Olosenga together. The area of these three lesser islands is, respectively, 13.6 square miles according to Dr. Wegener's map and 21.5 square miles according to the Hydrographic Office chart.

Referring now to some of the more salient differences in the two delineations of the shape and of the topography of the islands, it may be said that Ofu and Olosenga on both maps are not only different in size but in shape also. Ofu is more compact in form on Dr. Wegener's map and less elongated than on the Hydrographic Office chart; Olosenga on the former is rhomboid in shape, while on the latter it is triangular. That the southern point of Olosenga should project farther south than it does on the Hydrographic Office chart is shown by the fact, to which Dr. Wegener calls attention in the note accompanying his map, that, from the interior of the cove enclosed by the southern sides of Ofu and Olosenga, Tau Island is not visible. Ofu Dr. Wegener describes as a well-preserved crater open to the northwest. The survey made by the Wilkes Expedition shows a straight ridge. Olosenga, Dr. Wegener goes on to say, is the remnant of a volcanic cone that collapsed or exploded. The semicircular cliff at whose foot lies the village of Sili probably represents the southeastern enclosing wall of the crater. The two jagged crags Muli ulu forming the eastern tip of Ofu may be a part of this wall or else may represent the ruins of a third crater lying to the north. Both the crater of Ofu and the outer slope of the crater of Olosenga are occupied by native plantations.

Tau Island is also a crater: it is the best preserved of the group. A spur (called Utu Manua on Dr. Wegener's map) is represented as projecting from its northeastern corner on the Hydrographic Office chart. This is incorrect, says Dr. Wegener. A cove thus indicated south of it does not exist. This is the reason why the roadstead of the village of Tau is entirely unprotected against northerly winds. Dr. Wegener did not personally visit the southern, eastern or northern coasts of Tau Island. His map here is based on the statements of the local pilot Stephany.

Tutuila is described as being essentially a deeply dissected lava plateau. The ridges which have been carved out of this plateau are very differently represented on the two maps. On the Hydrographic Office chart they appear on the whole as isolated peaks capping a series of parallel ridges following the trend of the island, while on Dr. Wegener's map the interior relief of the island is represented rather as a single broad ridge from which subsidiary spurs project.

The greatest discrepancy between the two maps with regard to the topography of Tutuila relates to the island's southernmost prong. This is represented on Chart No. 90 as a mountainous district ending in a sharp point to the southwest: on Dr. Wegener's map it assumes the character of a flat foreland sheltering a line of villages on its inner side and bounded on its outer side by two craters, half of one of which is missing, so that a cross section of the crater may be seen from the sea. That the sharp point shown on Chart No. 90 is not the prominent projection it is there represented to be is evident from Chart No. 2637. On this recent chart (whose delineation has not yet been incorporated on Chart No. 90) this point (termed Leone Point, the equivalent of the point at Tua ulu on Dr. Wegener's map) is rather a subsidiary promontory lying at the junction of a N.N.W. and of an E.S.E. trending portion of the coast—if the gray color indicating land on Chart No. 2637 may so be interpreted with regard to this latter part of the coast-line, which was not included in the recent survey. This delineation, which, because of its large scale and its recent date, may be taken to be the most correct representation extant of this part of Tutuila, corroborates Dr. Wegener's survey. (Chart No. 2637, although based on a survey made in 1909, was not published until May, 1911. Dr. Wegener's survey was made, it will be remembered, in December, 1910.) The discrepant representation on the current edition of Chart No. 90 is taken from the survey of Leone Bay made in 1872 by Commander R. W. Meade of the U. S. S. *Narragansett,* formerly published as Chart No. 229. The probable inaccuracy in the representation of Leone Point may, in this case, be due to the greater inexactness often prevalent in the marginal regions of a survey.

Chart No. 2637 unfortunately gives no clue as to the configuration of the coast east of Leone Point. That here, too, there is urgent need of a resurvey is evidenced by the fact that on the current edition of Chart No. 90 this coast is stated to be reported to extend farther seaward; its supposed position is indicated on the chart by a line which emphasizes still more the southwestern projection of the foreland in general and of Leone Point in particular. The fallacy of this last representation may be assumed to be proved by the delineation on Chart No. 2637. That the entire foreland should likewise extend farther southwest also seems improbable. The implied southeastern trend of the coast line east of Leone Point on Chart No. 2637 bears this out. Furthermore, the statement that the foreland projects still farther southwest seems so improbable to Dr. Wegener that he cannot but interpret its reproduction on the German Admiralty Chart available to him as a typographic error. He thinks northeast must be meant. His map carries out this opinion. An additional indication of the improbability of a southwestern extension of the foreland is found in the original delineation of this region according to the survey of the Wilkes Expedition as given on editions of Chart No. 90 published prior to 1872. Here the foreland is more rounded in shape and, in this, resembles the representation on Dr. Wegener's map. The need of a resurvey of this region in particular is further evidenced by the fact that the southern promontory of the foreland bears two lights which, according to the current edition of Chart No. 90, are the guide lights for the approach to Tutuila from the west, specifically for reaching Pago Pago from Apia, the chief town of the Samoan Islands on the German island of Upolu. The uncertainty of the position of these lights (explicitly referred to on Chart No. 90) might well involve danger to navigation.

Several minor differences in the two maps may also be noted here. On Dr. Wegener's map Pola Island (termed Vatia Island on the Hydrographic Office chart) continues the northeast trend of the spur on the north shore of Tutuila, with which it is evidently allied; on Chart No. 90 this island has an exact north-south trend. This representation is repeated on the inset of Vatia Anchorage on Chart No. 92, which is based on a survey of 1900. Another difference concerns the representation of Aunuu Island. On Charts Nos. 90 and 93 Aunuu is roughly triangular in form with an apex directed northwest towards the mainland of Tutuila. Dr. Wegener represents the island as circular and describes it as a crater. Aunuu, too, is not without interest to navigators, as it bears a light illuminating the eastern approach to Tutuila. Of the two altitudes alone given on Dr. Wegener's map one differs from that given on the Hydrographic Office chart. To Matafao Peak, guarding the entrance to Pago Pago Harbor on the west, Dr. Wegener assigns 650 meters (the '5' is shown in reflected image on his map), the exact equivalent of the 2,133 feet of Chart No. 2563. Dr. Wegener's figure for Peoa (Pioa) Peak, to the east of the harbor, is 500 meters (the '5' on the map has undergone the same fate as its companion), or 1,640 feet. Chart No. 2563 gives 1,719 feet. It may be noted that the corresponding figures on a chart of the approach to Pago Pago, which also goes back to a survey by the U. S. S. *Narragansett* (shown on Chart No. 93), are, respectively, for Matafao Peak, 2,353 feet, and for Peoa Peak, 1,470 feet.

In his delineation of the most important part of Tutuila, Pago Pago Harbor (on Dr. Wegener's map, Fangaloa Bucht), Dr. Wegener differs considerably from the new detailed survey of that harbor published in September, 1910, by the Hydrographic Office as Chart No. 2563, already referred to. This difference mainly concerns the delineation of the western shore of the entrance to the harbor, especially of the cove forming the approach to Fa(n)gaalu. On Dr. Wegener's map this shore is less indented than it should be—for that Chart No. 2563, because of its much larger scale, is the superior authority in this case, there can be no doubt. Another case of a noticeable discrepancy between Dr. Wegener's map and a recent and undoubtedly more correct survey is to be found in his delineation of the southern coast of the western end of Tutuila between Utumea and Leone. On Chart No. 2637 this coast-line is much more indented by reentrant coves than on Dr. Wegener's map; this is particularly the case with the cove at whose head lies the hamlet of Seetana (Seetuga on Chart No. 2637). The general trend of this coast, furthermore, on the Hydrographic Office chart is E.S.E., while on Dr. Wegener's map it is practically east.

It is to be regretted that the note accompanying Dr. Wegener's map, which, for the most part, deals with the worthy subject of establishing the proper rendering of native names, does not contain a more detailed explanation of the differences between his map and existing charts. It would then be possible to know whether Charts Nos. 2563 and 2637 were consulted—as it was in all probability possible to do, if not prior to the date of his survey, at least before the final compilation of his map, as the former chart was published in September, 1910, and the latter in May, 1911—and, if so, what the reasons for the differences were.

However, the differences between the relevant portions of Dr. Wegener's map and the evidently more correct delineations on the recent charts of the Hydrographic Office affect only a relatively small part of the area considered and, therefore, need not be taken as a criterion for an unfavorable judgment of the remainder of his work. These differences should rather, as has been the aim of the above lines, emphasize the urgent necessity of a thorough general resurvey of all the Samoan Islands belonging to the United States.

W. L. G. J.

INSTRUCTION IN GEOGRAPHICAL SURVEYING

BY

I. N. DRACOPOLI

With the exception of the Royal Geographical Society of London, there is perhaps no school or college in English speaking countries where a private person may obtain efficient tuition in geographical surveying. The ordinary land surveyor cannot give adequate instruction, for astronomical observations have no part in his line of work and his methods are cumbersome and unsuitable when applied to large areas. It was to supply this need that the Council of the Royal Geographical Society appointed an instructor, Mr. E. A. Reeves, in surveying and map-making and arranged a course of work, which, when mastered, enables an explorer to profit by all his opportunities and to make as accurate and complete a survey as his time and means allow. The following is an outline of the work required:

Practical Astronomy. (*a*) Latitude.—Observations with the sextant and theodolite, including the adjustments, and finding index and level error. Computation of latitude by meridian altitudes of sun and stars, by circum-meridional altitudes, by Polaris and double altitudes. (*b*) Longitude and Time.—Observations with sextant and theodolite, and computations for finding local time by sun and stars, and thence the longitude; equal altitudes of the sun and stars for finding error and rate of watch. Telegraphic determinations of difference of longitude. Longitude by occultations of stars by the moon, and the prediction of the circumstances of occultations; longi-